

On the Action of Hydrochloric Acid and of Chlorine on Acetobenzoic Anhydride. By Wm. H. Greene, M.D.

(Read before the American Philosophical Society, March 19, 1880.)

In September last, M. Loir published, in the *Bulletin de la Société Chimique*, a paper upon the double function (alcohol and aldehyde) of various acids and anhydrides. I will not discuss the general conclusions of this article, which has found its way into many of the collections of scientific literature, but the paper contains grave errors upon certain of the reactions of acetobenzoic anhydride. According to M. Loir, this compound behaves differently with hydrochloric acid and with chlorine, accordingly as it has been prepared by the action of acetyl chloride upon sodium benzoate, or of benzoyl chloride upon sodium acetate. Made by the last of these processes, it is decomposed by hydrochloric acid at 130° , into acetyl chloride and benzoic acid : chlorine at 140° converts it into acetyl chloride and chlorobenzoic acid. Under the same circumstances, the anhydride prepared by the first process is unaffected, but at 160° hydrochloric acid converts it into benzoyl chloride and acetic acid ; at 170° under the action of chlorine it yields benzoyl chloride and chloracetic acid.

Acetobenzoic anhydride begins to decompose at a temperature below 150° , into acetic anhydride and benzoic anhydride, and at temperatures near this point it should act as would a mixture of the latter two bodies. Under the influence of hydrochloric acid it should yield acetyl chloride, acetic acid, benzoyl chloride and benzoic acid. Chlorine should act in an analogous manner. I have repeated the experiments of M. Loir, with the following results :

If dry hydrochloric acid be passed into acetobenzoic anhydride, at ordinary temperatures, the reaction is the same, by whichever process the anhydride may have been prepared : benzoic acid is deposited, and the tube conveying the hydrochloric acid becomes obstructed. On raising the temperature, acetyl chloride begins to distill at $55-60^{\circ}$, and the product obtained up to 130° is a mixture of acetyl chloride and acetic acid. If the heat be raised much above 130° , and if the current of hydrochloric acid be rapid, a small quantity of benzoyl chloride is carried over, and will be found in the distillate. The residue in the apparatus consists of benzoyl chloride and benzoic acid. If the anhydride be heated to 130° , or any other temperature, before passing the hydrochloric acid, the reaction is the same with the anhydride prepared by each process. However, it seems that the lower the temperature the greater the proportions of acetyl chloride and benzoic acid which are formed, while at higher temperatures ($130-150^{\circ}$), the reaction yields acetyl chloride, acetic acid, benzoyl chloride and benzoic acid in about equivalent proportions.

Chlorine acts in an analogous manner : the products are the same in whichever manner the anhydride may have been prepared ; but, with the exception of the acetyl chloride, these products are more difficult to

separate than those formed in the reaction with hydrochloric acid. Indeed, chloracetic acid boils at about 186° , and benzoyl chloride at 198° : in the experiments of M. Loir, the latter compound seems to have distilled over first, leaving the chloracetic acid in the retort. At temperatures near 150° , the products of this reaction are acetyl chloride, chloracetic acid, benzoyl chloride and chlorobenzoic acid; at lower temperatures, the principal products are acetyl chloride and chlorobenzoic acid.

From his experiments, M. Loir considers that there is a difference in constitution between benzoyl acetate and acetyl benzoate, but the results of these experiments being erroneous, such a conclusion is unsustained. These bodies thus named are identical; all of their reactions *under the same conditions* are the same, and they must be represented by the same rational formula.

Stated Meeting April 2, 1880.

Present, 12 members.

Mr. Fraley, Prof. P. E. Chase, Dr. R. E. Rogers, Mr. J. S. Price, Dr. Cresson, and Mr. Phillips signified by letter their acceptance of the appointment to represent the Society at Boston on the 26th of May.

Dr. Genth declined the appointment to prepare a notice of the late Prof. Roepper, on the score of ill-health.

A letter of envoy was received from the U. S. Naval Observatory in Washington.

A letter requesting contributions to the burnt library at St. John, New Brunswick, was received from Mr. Jas. Denville, Honorary Secretary, House of Commons, Canada, dated Ottawa, March 11, 1880.

Donations for the library were received from the Academies at Rome, Berlin, Brussels, and Philadelphia; the Geographical Society at Bordeaux; the Victoria Institute, R. Astronomical Society, and London Nature; the Societies at Quebec and Milwaukee; the Boston Natural History Society; Cambridge Museum C. Z., and New England Genealogical Society; the Observatories at Washington and Mexico; the University and Peabody Institute at Baltimore; Mr. J. S. Price, and Mr. Henry Phillips, Jr.

The death of Guillaume Philippe Schimper, at Paris,